REMARKS

Claims 2, 3, 5, 7-11, 13, 14, 17-19, 21, 22, and 24-33 were pending in this application.

Claims 2, 3, 5, 7, 9-11, 13, 14, 17-19, 21, 22, and 24-31 have been rejected.

Claims 8, 32, and 33 have been objected to.

Claims 7, 11, 17, and 24 have been amended as shown above.

Claims 8 and 33 have been cancelled.

Claims 2, 3, 5, 7, 9-11, 13, 14, 17-19, 21, 22, and 24-32 are now pending in this application.

Reconsideration and full allowance of all pending claims are respectfully requested.

I. FINALITY OF OFFICE ACTION

The November 28, 2008 Office Action cannot be made final.

The Office Action introduces a new ground of rejection against Claims 11, 19, and 27. According to the MPEP, an Office Action cannot be made final when the Office Action introduces a new ground of rejection that is neither "necessitated by applicant's amendment of the claims" nor based on information submitted in an IDS pursuant to 37 C.F.R. § 1.97(c). (*MPEP § 706.07(a)*).

The Office Action introduces a § 103 rejection against Claims 11, 19, and 27 involving a reference (Swinnen et al.) not previously cited against those claims. This reference is cited as disclosing or suggesting "that a generated matrix comprises a forward column Hankel matrix based on a prediction error," where the prediction error is "associated with the one or more model parameters" that are "associated with [a] defined area" in an upper triangular matrix.

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(*Office Action, Page 11, Second paragraph*).

These elements of Claims 11, 19, and 27 were contained in the claims <u>as originally filed</u>. In other words, these elements have been pending in the claims for <u>almost five years</u>. The Applicant's prior amendment did not change those elements in any way. The citation of the Swinnen reference against those claim elements could not possibly have been necessitated by the Applicant's amendments to Claims 11, 19, and 27.

Moreover, the Swinnen reference was provided by the Applicant in an IDS filed more than a year ago, not in an IDS filed recently under 37 C.F.R. § 1.97(c).

While the Office is free to cite the Swinnen reference against the claims now, the Office cannot make that rejection final. Accordingly, the finality of the November 28, 2008 Office Action is improper and should be withdrawn.

II.   CLAIM OBJECTIONS

The Office Action objects to Claims 2-3, 5, and 7-11 as not being tied to a specific machine or apparatus and therefore possibly directed to non-statutory subject matter. The Applicant has amended Claims 7 and 11 to recite that certain functions are performed electronically. This ties the claims to a machine or apparatus and prevents the claims from being construed as including mere mental steps.

Accordingly, the Applicant respectfully requests withdrawal of the objection to the claims.

III.   REJECTION UNDER 35 U.S.C. § 103

The Office Action rejects Claims 2, 3, 5, 7, 9, 10, 13, 14, 17, 18, 21, 22, 24-26, and 28-30

under 35 U.S.C. § 103(a) as being unpatentable over U.S. Patent Publication No. 2004/0057585

to Madievski et al. ("*Madievski*") in view of U.S. Patent Publication No. 2005/0015205 to

Repucci et al. ("*Repucci*"). The Office Action rejects Claims 11, 19, and 27 under 35 U.S.C.

§ 103(a) as being unpatentable over *Madievski* and *Repucci* in further view of Swinnen et al.,

"Detection and multichannel SVD-based filtering of trigeminal somatosensory evoked

potentials" ("*Swinnen*"). The Office Action rejects Claim 31 under 35 U.S.C. § 103(a) as being

unpatentable over *Madievski* and *Repucci* in further view of U.S. Patent Publication No.

2003/0004658 to Bechhoefer et al. ("*Bechhoefer*"). These rejections are respectfully traversed.

In *ex parte* examination of patent applications, the Patent Office bears the burden of

establishing a *prima facie* case of obviousness. (*MPEP § 2142; In re Fritch, 972 F.2d 1260,

1262, 23 U.S.P.Q.2d 1780, 1783 (Fed. Cir. 1992)*). The initial burden of establishing a *prima

facie* basis to deny patentability to a claimed invention is always upon the Patent Office. (*MPEP

§ 2142; In re Oetiker, 977 F.2d 1443, 1445, 24 U.S.P.Q.2d 1443, 1444 (Fed. Cir. 1992); In re

Piasecki, 745 F.2d 1468, 1472, 223 U.S.P.Q. 785, 788 (Fed. Cir. 1984)*). Only when a *prima

facie* case of obviousness is established does the burden shift to the Applicant to produce

evidence of nonobviousness. (*MPEP § 2142; In re Oetiker, 977 F.2d 1443, 1445, 24 U.S.P.Q.2d

1443, 1444 (Fed. Cir. 1992); In re Rijckaert, 9 F.3d 1531, 1532, 28 U.S.P.Q.2d 1955, 1956

(Fed. Cir. 1993)*). If the Patent Office does not produce a *prima facie* case of unpatentability,

then without more the Applicant is entitled to grant of a patent. (*In re Oetiker, 977 F.2d 1443,

1445, 24 U.S.P.Q.2d 1443, 1444 (Fed. Cir. 1992); In re Grabiak, 769 F.2d 729, 733, 226

U.S.P.Q. 870, 873 (Fed. Cir. 1985)).

CLAIMS 7, 17, AND 24

Claims 7 and 24 have been amended to incorporate elements previously recited in Claims 8 and 33, respectively. Based on the indication of allowability regarding Claims 8 and 33 (*Office Action, Page 12, Section 6*), Claims 7 and 24 and their dependent claims are in condition for allowance.

Claim 17 has been amended to incorporate the elements identified in the Office Action. (*Office Action, Page 12, Section 8*). The Office Action indicates that the inclusion of these elements would render the claims allowable. (*Office Action, Page 12, Section 8*). Because of this, Claim 17 and its dependent claims are in condition for allowance.

Accordingly, the Applicant respectfully requests full allowance of Claims 2, 3, 5, 7, 9, 10, 13, 14, 17, 18, 21, 22, 24-26, and 28-32.

CLAIMS 11, 19, AND 27

Claims 11, 19, and 27 recite:

(i) generating a "forward column Hankel matrix based on a prediction error" for each of multiple "defined areas" in a "first upper triangular matrix";

(ii) performing "canonical QR-decomposition" on each generated matrix to form a "second upper triangular matrix" with an "upper right portion denoted R_{E3}";

(iii) identifying a "value for $\left\| R_{E3} \right\|_2^2$" for each second upper triangular matrix; and

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(iv) selecting one or more model parameters associated with the defined area having the

"second upper triangular matrix with a smallest value for $\left\| R_{E3} \right\|_2^2$."

The Office Action cites *Swinnen* as disclosing the generation of a "forward column

Hankel matrix based on a prediction error" for each "defined area in [a] first upper triangular

matrix."

The algorithm disclosed on pages 302-303 of *Swinnen* (and cited in the Office Action)

contains five steps. Step 1 involves the collection of N data points for each of K channels. Step

2 involves arranging the data points in multiple Hankel matrices and concatenating the matrices

to form a "block-Hankel matrix." Step 3 involves performing singular value decomposition

(SVD) on the block-Hankel matrix and sorting the singular values in descending order. Step 4

involves setting the smallest singular values to zero. Step 5 involves restoring the Hankel

structure in the block-Hankel matrix. (*Swinnen, Pages 302-303*).

Each of the individual Hankel matrices and the block-Hankel matrix formed during Step

2 of this algorithm represents a matrix formed using the data samples associated with multiple

channels. In other words, *Swinnen* is merely taking data samples for multiple channels and

placing them in Hankel matrices. Nothing here indicates that any Hankel matrix is formed

during Step 2 of the *Swinnen* algorithm based on a "prediction error" associated with "one or

more model parameters," where the model parameters are associated with a "defined area" in an

upper triangular matrix. In fact, the Applicant can find nothing in the entire algorithm of

Swinnen indicating that any matrix is generated based on a "prediction error" associated with

"one or more model parameters" as recited in Claims 11, 19, and 27.

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Moreover, the Office Action cites paragraphs [0090] and [0096] of *Repucci* in the rejection of these claims. Paragraph [0090] discusses using a transformation Q (which attains a global minimum value of R_{HD}) to compute temporal components T_{HD}. *Repucci* clearly defines R_{HD} in paragraph [0084] as:

$$R_{HD} = \sum_{l=1}^{L} \sum_{p=2}^{P} \sum_{q=1}^{p-1} [(QA_l^{'}Q^T)_{p,q}]^2 .$$

Here, A_l' appears to denote autoregressive coefficients, and Q appears to represent an orthogonal transformation. (*Repucci, Par. [0068]*). It would be improper to simply replace the value R_{HD} in *Repucci* with a Hankel matrix containing only unprocessed data samples from *Swinnen*. The algorithm of *Repucci* defines the value R_{HD} in a specific manner, and it is not merely unprocessed data samples of multiple channels as recited in *Swinnen*. A modification to *Repucci* in this way would render the algorithm of *Repucci* inoperative. The same is true for the value T_{HD}.

Paragraphs [0092]-[0096] of *Repucci* describe the computation of a value R_{TOTAL} as the sum of R_{DIAG}, R_{UPPER}, and R_{LOWER}, which are defined as:

$$R_{TOTAL} = \sum_{l=1}^{L} \sum_{p=1}^{P} \sum_{q=1}^{P} F_{p,q,l}^2$$

$$R_{DIAG} = \sum_{l=1}^{L} \sum_{p=1}^{P} F_{p,p,l}^2$$

$$R_{UPPER} = \sum_{l=1}^{L} \sum_{p=1}^{P-1} \sum_{q=p+1}^{P} F_{p,q,l}^2$$

$$R_{LOWER} = \sum_{l=1}^{L} \sum_{p=2}^{P} \sum_{q=1}^{p-1} F_{p,q,l}^2$$

Here, F represents "A, A' or A_{HD}." (*Repucci, Par. [0092]*). "A" appears to represent an array of MLAR model coefficients, and "A_{HD}" appears to represent a set of upper-triangular matrices. (*Repucci, Pars. [0085] and [0099]*). Once again, it would be improper to simply replace the value F in *Repucci* with a Hankel matrix containing only unprocessed data samples from *Swinnen*. While one value of F may denote "model coefficients" and another value of F may denote an upper triangular matrix, none of the values of F is defined as data samples of multiple channels as recited in *Swinnen*. A modification to *Repucci* in this way would again render the algorithm of *Repucci* inoperative.

The Office Action has not shown that (i) *Swinnen* generates a Hankel matrix based on a prediction error associated with an area of an upper triangular matrix or (ii) *Repucci* could be modified to include the actual matrix generated in *Swinnen*.

In addition, the proposed motivation for modifying *Repucci* with *Swinnen* is deficient. The proposed motivation for this modification is that it would "improve the signal to noise ratio and extraction of the characteristic components of the original signal" as noted in *Swinnen*. However, these benefits of *Swinnen* are obtained by implementing the "multichannel SVD-based filtering algorithm" of *Swinnen*. (*Swinnen, Page 301, Section 4.2, First paragraph*). In other words, these benefits of *Swinnen* are obtained by implementing the <u>entire</u> filtering algorithm (Steps 1-5), not merely a single step of the algorithm (such as Step 2).

Nothing in *Swinnen* indicates that these benefits can be obtained by only incorporating Step 2 of the *Swinnen* algorithm into *Repucci*. Step 2 of the *Swinnen* algorithm merely involves constructing Hankel matrices using unprocessed data samples. Step 2 does not actually involve processing those matrices in order to perform SVD-based filtering. Also, the Office Action has

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not shown that the later steps of the *Swinnen* algorithm can be incorporated into *Repucci*. Even if they could, however, *Swinnen* still fails to disclose or suggest that the Hankel matrices are constructed based on prediction error.

For these reasons, the Office Action fails to establish a *prima facie* case of obviousness against Claims 11, 19, and 27.

Accordingly, the Applicant respectfully requests full allowance of Claims 11, 19, and 27.

SUMMARY

The Applicant respectfully asserts that all pending claims in this application are in condition for allowance and respectfully requests full allowance of the claims.
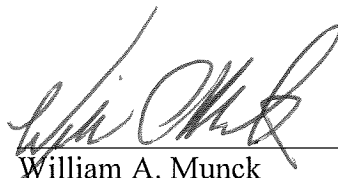
If any issues arise or if the Examiner has any suggestions for expediting allowance of this application, the Applicant respectfully invites the Examiner to contact the undersigned at the telephone number indicated below or at *wmunck@munckcarter.com*.

The Commissioner is hereby authorized to charge any fees connected with this communication (including any extension of time fees) or credit any overpayment to Deposit Account No. 50-0208.

Respectfully submitted,

MUNCK CARTER, P.C.

Date: _Jan. 23, 2009_

William A. Munck
Registration No. 39,308

Legal Department Docket Clerk
101 Columbia Road
P.O. Box 2245
Morristown, New Jersey 07962
Phone: (602) 313-5683
Fax: (602) 313-4559